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(71) Applicant (for all designated States except US): INDIGO N.V. [NL/NL]; Luchthaven Weg 59-Vii, NL-5507 SM Veldhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): GAZIT, Alon [IL/IL]; 113B Habanim, 70400 Nes Ziona (IL). IDAN, David [IL/IL]; 3/10 Harei Shomron Street, 77276 Ashdod (IL). INBAR, Hanni [IL/IL]; 32 Eilat Street, 58361 Holon (IL). KANDER, Ilan [IL/IL]; 14/8 Netiv Halamed He Street,

43000 Ranaana (IL). KRITCHMAN, Eli [IL/IL]; Mismeret 56, 69012 Tel Aviv (IL). LANDA, Benzion [CA/CA]; 10010-119 Street, Edmonton, Alberta T5K 1Y8 (CA). LAVON, Amiran [IL/IL]; 143/5 Balfour, 59576 Bat Yam (IL). LEVANON, Moshe [IL/IL]; Kefar Aharon-2B, 70400 Nes Ziona (IL). LIOR, Ishaiu [IL/IL]; 21 Bilu Street, 74000 Nes Ziona (IL). VAN MIL, Jan [NL/IL]; 37820 Kibutz Regavim (IL). NIV, Yehuda [IL/IL]; 11 Kefar Aharon, 74051 Nes Ziona (IL). SCHNEIDER, Avner [IL/IL]; 41 Bialik, 70400 Nes Ziona (IL). SHMAISER, Aron [IL/IL]; 5 Pinchasovich Street, 75266 Rison Lezion (IL). YOUNES, Hani [IL/IL]; Ara Village, P.O. Box 141, 30025 Mesholash (IL).

(74) Agent: DE BRUIJN, Leendert, C.; Nederlandsch Octrooibureau, Scheveningseweg 82, P.O. Box 29720, NL-2502 LS The Hague (NL).

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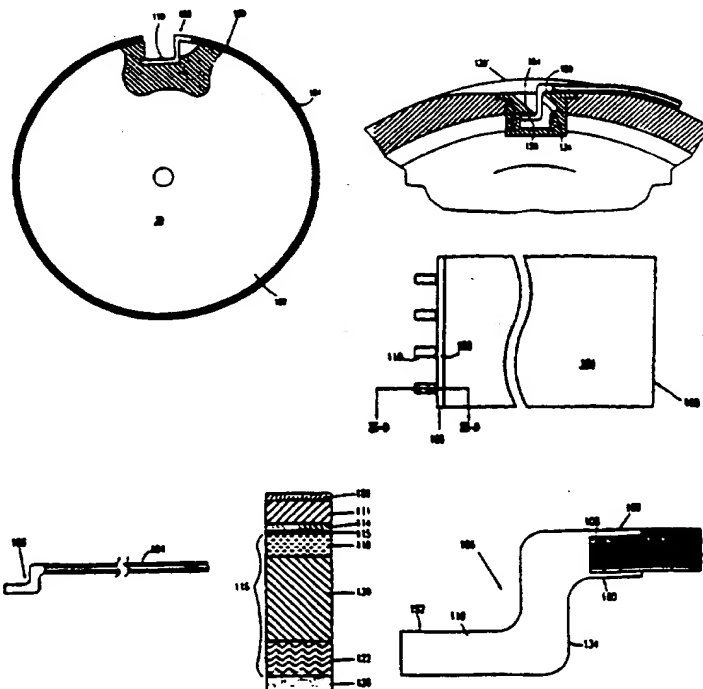
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(54) Title: IMAGING APPARATUS AND INTERMEDIATE TRANSFER BLANKET THEREFOR

(57) Abstract

Imaging apparatus including an imaging surface having a toner image formed thereon and an intermediate transfer member (30, 102, 104), which receives the toner image from the imaging surface and from which it is subsequently transferred. The intermediate transfer member (30, 102, 104) includes a drum (30) having mounting recesses formed therein and an intermediate transfer blanket (104) mounted on the drum (30). The blanket (104) has a layered transfer portion having a transfer surface (109) on one face thereof which receives the toner image and optionally an adhesive layer (126) on the opposite face thereof and a mounting fixture (106), attached to one edge of the layered transfer portion and adapted to mate with the mounting recesses in the drum, whereby the transfer blanket (104) is fixedly and removably mounted on the drum (30).



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1 IMAGING APPARATUS AND INTERMEDIATE TRANSFER BLANKET THEREFOR

2 FIELD OF THE INVENTION

3 The present invention relates to image forming and
4 image transfer apparatus especially for use in electrostatic
5 imaging using an intermediate transfer blanket.

6 BACKGROUND OF THE INVENTION

7 The use of an intermediate transfer member in
8 electrostatic imaging is well known.

9 Various types of intermediate transfer members are
10 known and are described, for example in U.S. Patents
11 3,862,848, 4,684,238, 4,690,539 and 4,531,825 and in the
12 RELATED APPLICATIONS listed above, the specifications of all
13 of which are incorporated herein by reference.

14 Belt-type intermediate transfer members for use in
15 electrophotography are known in the art and are described,
16 inter alia, in U.S. Patents 3,893,761, 4,684,238 and
17 4,690,539, the specifications of which are incorporated
18 herein by reference.

19 The use of intermediate transfer members and members
20 including transfer blankets for offset ink printing is also
21 well known. Such blankets have characteristics which are
22 suitable for ink transfer but are generally not usable, per
23 se, for liquid toner imaging.

24 SUMMARY OF THE INVENTION

25 The present invention seeks to provide, in one aspect
26 thereof, improved image transfer apparatus using an improved
27 intermediate transfer member.

28 The present invention further seeks to provide, in a
29 second aspect thereof, an improved image transfer member for
30 use in imaging apparatus, especially in image forming
31 apparatus using electrostatically charged toner.

32 The present invention further seeks to provide, in a
33 third aspect thereof, an improved image transfer blanket for
34 use as part of the image transfer member in imaging
35 apparatus, especially in image forming apparatus using
36 electrostatically charged toner.

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1 There is thus provided in accordance with a preferred
2 embodiment of the invention, imaging apparatus comprising:

3 an imaging surface having an image, preferably a toner
4 image formed thereon; and

5 an intermediate transfer member, which receives the
6 toner image from the imaging surface and from which it is
7 subsequently transferred, comprising:

8 a drum having mounting recesses formed therein;
9 and

10 an intermediate transfer blanket mounted on the
11 drum, the blanket comprising:

12 a layered transfer portion having a transfer
13 surface on one face thereof which receives the toner image
14 and preferably an adhesive layer on an opposite surface
15 thereof; and

16 a mounting fixture, attached to only one
17 edge of the layered transfer portion and adapted to mate
18 with the mounting recesses in the drum,

19 whereby the transfer blanket is removably mounted on
20 the drum.

21 In a preferred embodiment of the invention at least a
22 portion of a surface of the layered transfer portion
23 opposite to the transfer surface is bonded to the drum.

24 Preferably, the layered transfer portion comprises an
25 electrically conductive layer underlying the transfer
26 surface; and the mounting fixture comprises an electrically
27 conductive element, attached to one edge of the transfer
28 portion, which is electrically connected to the electrically
29 conductive layer.

30 In a preferred embodiment of the invention, the
31 electrically conductive element, which preferably comprises
32 at least one "L" shaped finger-like extension extending
33 therefrom, that contacts the drum, wherein the drum is
34 electrified to a voltage which is operative to transfer the
35 toner image from the imaging surface to the transfer
36 surface. Preferably, said at least one "L" shaped extension

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1 has a first portion extending in a direction perpendicular
2 to the layered transfer portion and a second portion
3 attached and substantially perpendicular to the first
4 portion and extending substantially parallel to and away
5 from the layered transfer portion.

6 Preferably, the mounting recesses further comprise
7 recesses therein which receive said second portion.

8 There is further provided in accordance with a
9 preferred embodiment of the invention, a substantially
10 rectangular intermediate transfer blanket comprising:

11 a layered transfer portion having a transfer surface on
12 one face thereof; and

13 a mounting fixture, adapted for mounting the blanket on
14 a drum, attached to only one edge of the layered transfer
15 portion.

16 Preferably, the layered transfer portion comprises an
17 electrically conductive layer underlying the transfer
18 surface; and the mounting fixture comprises an electrically
19 conductive element, attached to one edge of the transfer
20 portion, which is electrically connected to the electrically
21 conductive layer.

22 Preferably, the electrically conductive element
23 comprises at least one "L" shaped finger-like extension
24 extending therefrom, which extension preferably has a first
25 portion extending in a direction perpendicular to the
26 layered transfer portion and a second portion attached and
27 substantially perpendicular to the first portion and
28 extending substantially parallel to and away from the
29 layered transfer portion.

30 In a preferred embodiment of the invention the layered
31 transfer portion comprises a conformal layer formed of a
32 material having a Shore A hardness of less than 65,
33 preferably less than about 50 and more than about 30.

34 Preferably, the transfer surface is a release layer for
35 toner.

36 There is further provided in accordance with a

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1 preferred embodiment of the invention, a substantially
2 rectangular intermediate transfer blanket comprising:

3 a layered transfer portion having a transfer surface on
4 one face and including a conductive layer underlying the
5 transfer surface; and

6 a conductive element, attached to one edge of the
7 transfer portion, which is electrically connected to the
8 conducting layer.

9 There is further provided in accordance with a
10 preferred embodiment of the invention, a layered
11 intermediate transfer member and blanket comprising:

12 a transfer surface on one face; and

13 a conforming layer having a shore A hardness of less
14 than about 65, preferably less than about 50 and preferably
15 more than about 30.

16 There is further provided in accordance with a
17 preferred embodiment of the invention, a layered
18 intermediate transfer blanket comprising:

19 a transfer surface on one face of the blanket; and

20 an adhesive layer on the opposite face of the blanket
21 which is stable at a temperature of at least 80°C,
22 preferably above 100°C, more preferably above 120°C, most
23 preferably above 150°C.

24 There is further provided in a preferred embodiment of
25 the invention, a layered intermediate transfer blanket
26 comprising:

27 an transfer surface on one face of the blanket; and

28 a soft layer on the opposite face of the blanket which
29 has a Shore A hardness of less than 90, more preferably less
30 than 45, most preferably less than 25.

31 In a preferred embodiment of the invention the soft
32 layer comprises an acrylic polymer.

33 In a preferred embodiment of the invention the layered
34 transfer portion comprises an adhesive layer on a side
35 thereof opposite to the transfer surface.

36 There is further provided in accordance with a

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1 preferred embodiment of the invention, imaging apparatus for
2 performing an imaging process, comprising:

3 an imaging surface having a liquid toner image
4 comprising toner particles and carrier liquid formed
5 thereon; and

6 an intermediate transfer member, which receives the
7 toner image from the imaging surface and from which it is
8 subsequently transferred, comprising:

9 a layered transfer portion having a transfer
10 surface on one face thereof which receives the toner image;

11 a resilient layer underlying the transfer surface
12 which comprises a material which is at least partly
13 leachable by the carrier liquid; and

14 a barrier layer, preferably comprising at least
15 partially hydrolyzed polyvinyl alcohol, that is
16 substantially impervious to the carrier liquid and is
17 situated intermediate the resilient layer and the transfer
18 surface.

19 There is further provided, in a preferred embodiment of
20 the invention a layered intermediate transfer member
21 comprising:

22 a transfer surface;

23 a resilient layer underlying the transfer surface which
24 comprises a material which is at least partly leachable by a
25 liquid hydrocarbon; and

26 a barrier layer, preferably comprising at least
27 partially hydrolyzed polyvinyl alcohol, that is
28 substantially impervious to the liquid hydrocarbon and is
29 situated intermediate the resilient layer and the transfer
30 surface.

31 There is further provided, in accordance with a
32 preferred embodiment of the invention, a layered
33 intermediate transfer member for receiving liquid toner
34 images comprising toner particles and carrier liquid
35 comprising:

36 a transfer surface;

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1 a resilient layer underlying the transfer surface which
2 comprises a material which is at least partly leachable in
3 the carrier liquid; and

4 a barrier layer, preferably comprising at least
5 partially hydrolyzed polyvinyl alcohol, that is
6 substantially impervious to the carrier liquid and is
7 situated intermediate the resilient layer and the transfer
8 surface.

9 There is further provided, in accordance with a
10 preferred embodiment of the invention, imaging apparatus for
11 performing an imaging process, comprising:

12 an imaging surface having a liquid toner image
13 comprising toner particles and carrier liquid formed
14 thereon; and

15 an intermediate transfer member, which receives the
16 toner image from the imaging surface and from which it is
17 subsequently transferred, comprising:

18 a layered transfer portion having a transfer
19 surface on one face thereof which receives the toner image;

20 a resilient layer underlying the transfer surface
21 which comprises a material which interferes with the
22 operation of the imaging process;

23 a barrier layer, preferably comprising at least
24 partially hydrolyzed polyvinyl alcohol, that is
25 substantially impervious to the interfering material
26 comprised in the resilient layer and is situated
27 intermediate the resilient layer and the transfer surface.

28 In a preferred embodiment of the invention, the
29 material is a gas and the barrier layer is a barrier layer
30 for gasses.

31 There is further provided, in accordance with a
32 preferred embodiment of the invention, a layered
33 intermediate transfer member, comprising:

34 a transfer surface;

35 a resilient layer underlying the transfer surface; and

36 a barrier layer, preferably comprising at least

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1 partially hydrolyzed polyvinyl alcohol, that is
2 substantially impervious to liquid hydrocarbons and is
3 situated intermediate the resilient layer and the transfer
4 surface.

5 There is further provided, in accordance with a
6 preferred embodiment of the invention, a layered
7 intermediate transfer member, comprising:

8 a transfer surface;

9 a resilient layer underlying the transfer surface which
10 releases gases; and

11 a barrier layer, preferably comprising at least
12 partially hydrolyzed polyvinyl alcohol, that is
13 substantially impervious to the gasses and is situated
14 intermediate the resilient layer and the transfer surface.

15 There is further provided, in accordance with a
16 preferred embodiment of the invention, a layered
17 intermediate transfer member for receiving liquid toner
18 images comprising toner particles and carrier liquid
19 comprising:

20 a transfer surface;

21 a resilient layer underlying the transfer surface
22 comprising a material which is at least partly leachable in
23 the carrier liquid; and

24 a barrier layer, preferably comprising at least
25 partially hydrolyzed polyvinyl alcohol, that is
26 substantially impervious to the carrier liquid and is
27 situated intermediate the resilient layer and the transfer
28 surface.

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1 BRIEF DESCRIPTION OF THE DRAWINGS

2 The present invention will be understood and
3 appreciated more fully from the following detailed
4 description, taken in conjunction with the drawings in
5 which:

6 Fig. 1 is a simplified sectional illustration of
7 electrostatic imaging apparatus constructed and operative in
8 accordance with a preferred embodiment of the present
9 invention;

10 Fig. 2 is a simplified enlarged sectional illustration
11 of the apparatus of Fig. 1;

12 Fig. 3A is a simplified, cross-sectional side view of
13 an intermediate transfer member, including a removable
14 intermediate transfer blanket mounted on a drum, in
15 accordance with a preferred embodiment of the invention;

16 Fig. 3B is a partially cut-away top view of the
17 intermediate transfer member of Fig. 3A;

18 Figs. 4A and 4B are respective top and side views of an
19 intermediate transfer blanket in accordance with a preferred
20 embodiment of the invention;

21 Fig. 4C shows details of the layered construction of
22 the intermediate transfer blanket in accordance with a
23 preferred embodiment of the invention;

24 Fig. 4D is a cut-away expanded view of a securing
25 mechanism on the intermediate transfer blanket of Figs 4A
26 and 4B; and

27 Fig. 5 is a simplified cross-sectional illustration of
28 a portion of an intermediate transfer member, including a
29 removable intermediate transfer blanket mounted on a drum in
30 accordance with another preferred embodiment of the
31 invention.

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1 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

2 Reference is now made to Figs. 1 and 2 which illustrate
3 a multicolor electrostatic imaging system constructed and
4 operative in accordance with a preferred embodiment of the
5 present invention. As seen in Figs. 1 and 2 there is
6 provided an imaging sheet, preferably an organic
7 photoreceptor 12, typically mounted on a rotating drum 10.
8 Drum 10 is rotated about its axis by a motor or the like
9 (not shown), in the direction of arrow 18, past charging
10 apparatus 14, preferably a corotron, scorotron or roller
11 charger or other suitable charging apparatus known in the
12 art and which is adapted to charge the surface of sheet
13 photoreceptor 12. The image to be reproduced is focused by
14 an imager 16 upon the charged surface 12 at least partially
15 discharging the photoconductor in the areas struck by light,
16 thereby forming the electrostatic latent image. Thus, the
17 latent image normally includes image areas at a first
18 electrical potential and background areas at another
19 electrical potential.

20 Photoreceptor sheet 12 may use any suitable
21 arrangement of layers of materials as is known in the art,
22 however, in the preferred embodiment of the photoreceptor
23 sheet, certain of the layers are removed from the ends of
24 the sheet to facilitate its mounting on drum 10.

25 This preferred photoreceptor sheet and preferred
26 methods of mounting it on drum 10 are described in a co-
27 pending U.S. Patent application of Belinkov et al., IMAGING
28 APPARATUS AND PHOTORECEPTOR THEREFOR, filed September 7,
29 1994, assigned serial number 08/301,775, and on applications
30 filed in other countries claiming priority therefrom, the
31 disclosure of which is incorporated herein by reference.
32 Alternatively, photoreceptor 12 may be deposited on the drum
33 10 and may form a continuous surface. Furthermore,
34 photoreceptor 12 may be a non-organic type photoconductor
35 based, for example, on a compound of Selenium.

36 Imaging apparatus 16 may be a modulated laser beam

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1 scanning apparatus, an optical focusing device for imaging a
2 copy on a drum or other imaging apparatus such as is known
3 in the art.

4 Also associated with drum 10 and photoreceptor sheet
5 12, in the preferred embodiment of the invention, are a
6 multicolor liquid developer spray assembly 20, a developing
7 assembly 22, color specific cleaning blade assemblies 34, a
8 background cleaning station 24, an electrified squeegee 26,
9 a background discharge device 28, an intermediate transfer
10 member 30, cleaning apparatus 32, and, optionally, a
11 neutralizing lamp assembly 36.

12 Developing assembly 22 preferably includes a
13 development roller 38. Development roller 38 is preferably
14 spaced from photoreceptor 12 thereby forming a gap
15 therebetween of typically 40 to 150 micrometers and is
16 charged to an electrical potential intermediate that of the
17 image and background areas of the image. Development roller
18 38 is thus operative, when maintained at a suitable voltage,
19 to apply an electric field to aid development of the latent
20 electrostatic image.

21 Development roller 38 typically rotates in the same
22 sense as drum 10 as indicated by arrow 40. This rotation
23 provides for the surface of sheet 12 and development roller
24 38 to have opposite velocities at the gap between them.

25 Multicolor liquid developer spray assembly 20, whose
26 operation and structure is described in detail in U.S.
27 Patent 5,117,263, the disclosure of which is incorporated
28 herein by reference, may be mounted on axis 42 to allow
29 assembly 20 to be pivoted in such a manner that a spray of
30 liquid toner containing electrically charged pigmented toner
31 particles can be directed either onto a portion of the
32 development roller 38, a portion of the photoreceptor 12
33 or directly into a development region 44 between
34 photoreceptor 12 and development roller 38. Alternatively,
35 assembly 20 may be fixed. Preferably, the spray is directed
36 onto a portion of the development roller 38.

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1 Color specific cleaning blade assemblies 34 are
2 operatively associated with developer roller 38 for separate
3 removal of residual amounts of each colored toner remaining
4 thereon after development. Each of blade assemblies 34 is
5 selectably brought into operative association with developer
6 roller 38 only when toner of a color corresponding thereto
7 is supplied to development region 44 by spray assembly 20.
8 The construction and operation of cleaning blade assemblies
9 is described in PCT Publication WO 90/14619 and in US patent
10 5,289,238, the disclosures of which are incorporated herein
11 by reference.

12 Each cleaning blade assembly 34 includes a toner
13 directing member 52 which serves to direct the toner
14 removed by the cleaning blade assemblies 34 from the
15 developer roller 38 to separate collection containers 54,
16 56, 58, and 60, for each color to prevent contamination of
17 the various developers by mixing of the colors. The toner
18 collected by the collection containers is recycled to a
19 corresponding toner reservoir (55, 57, 59 and 61). A final
20 toner directing member 62 always engages the developer
21 roller 38 and the toner collected thereat is supplied into
22 collection container 64 and thereafter to reservoir 65 via
23 separator 66 which is operative to separate relatively clean
24 carrier liquid from the various colored toner particles. The
25 separator 66 may be typically of the type described in U.S.
26 Patent 4,985,732, the disclosure of which is incorporated
27 herein by reference.

28 In a preferred embodiment of the invention, as
29 described in U.S. Patent 5,255,058, the disclosure of which
30 is incorporated herein by reference, where the imaging speed
31 is very high, a background cleaning station 24 typically
32 including a reverse roller 46 and a fluid spray apparatus 48
33 is provided. Reverse roller 46 which rotates in a direction
34 indicated by arrow 50 is electrically biased to a potential
35 intermediate that of the image and background areas of
36 photoconductive drum 10, but different from that of the

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1 development roller. Reverse roller 46 is preferably spaced
2 apart from photoreceptor sheet 12 thereby forming a gap
3 therebetween which is typically 40 to 150 micrometers.

4 Fluid spray apparatus 48 receives liquid toner from
5 reservoir 65 via conduit 88 and operates to provide a supply
6 of preferably non-pigmented carrier liquid to the gap
7 between sheet 12 and reverse roller 46. The liquid supplied
8 by fluid spray apparatus 48 replaces the liquid removed from
9 drum 10 by development assembly 22 thus allowing the
10 reverse roller 46 to remove charged pigmented toner
11 particles by electrophoresis from the background areas of
12 the latent image. Excess fluid is removed from reverse
13 roller 46 by a liquid directing member 70 which continuously
14 engages reverse roller 46 to collect excess liquid
15 containing toner particles of various colors which is in
16 turn supplied to reservoir 65 via a collection container 64
17 and separator 66.

18 The apparatus embodied in reference numerals 46, 48, 50
19 and 70 is not required for low speed systems, but is
20 preferably included in high speed systems.

21 Preferably, an electrically biased squeegee roller 26
22 is urged against the surface of sheet 12 and is operative to
23 remove liquid carrier from the background regions and to
24 compact the image and remove liquid carrier therefrom in the
25 image regions. Squeegee roller 26 is preferably formed of
26 resilient slightly conductive polymeric material as is well
27 known in the art, and is preferably charged to a potential
28 of several hundred to a few thousand volts with the same
29 polarity as the polarity of the charge on the toner
30 particles.

31 In a first preferred embodiment the squeegee roller is
32 made by molding a soft polyurethane rubber coating onto a
33 metal core, coating the molded core with a conductive
34 lacquer and coating the lacquer with a low conductivity
35 elastomer. Alternatively, in a second embodiment, the molded
36 coating can be made of an elastomer with a controlled

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1 conductivity and the lacquer can be omitted. In a third
2 embodiment, a single coating of controlled conductivity
3 elastomer is used and the outer layer is omitted.

4 In the first squeegee embodiment the metal core is
5 cleaned, and coated with a rubber to metal adhesive, such
6 as, for example CILBOND 49 SF (Compounding Ingredients
7 Limited, UK) dissolved in an equal amount of methyl ethyl
8 ketone, which is dried at 110°C for one hour. An outer mold
9 having a diameter about 9.5 mm greater than that of the core
10 is dip coated with a release agent, such as, for example, a
11 mixture of 10 parts Syl-Off 7600 (Dow Corning), 1 part Syl-
12 Off 7601 and 150 parts n-hexane which is then cured for one
13 hour at 110°C. The space between the core and the mold (pre-
14 heated to 70-80°C) is filled with polyurethane rubber for
15 casting (CIL A 20, Compounding Ingredients Limited, UK)
16 which is preheated under vacuum at 80°C for 16 hours and
17 then at 120°C for an additional hour. The polyurethane is
18 cured at 135°C for 8 hours. After cooling and removal of the
19 coated core from the mold (which removal may be aided by a
20 solvent, such as Isopar), the cast material is ground to
21 size to approximately ± 5 micrometers. The preferred hardness
22 of the coating is about 20 Shore A, although this hardness
23 may vary from 15-40 Shore A depending on the amount of
24 liquid removal desired.

25 The ground surface is cleaned with acetone and
26 preferably dip coated with a conductive lacquer (preferably,
27 3 parts H322 (Lord Corporation, USA) and 1 part ethyl
28 acetate) which has been prefiltered through a lint free
29 cloth to give a thickness (after drying) of about 30
30 micrometers.

31 A top layer of 50 parts Fomrez 50 (Witco. Corp., USA)
32 dissolved in 75 parts ethyl acetate to which is added 3
33 parts of DC193 (Dow Corning) and about 6 parts of di-phenyl
34 methane 4,4' di-isocyanate (MDI) (Desmodor 44V20
35 manufactured by Bayer, Germany) is filtered and dip coated
36 onto the lacquer coating a plurality of times to achieve a

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1 coating thickness of 60-70 micrometers. The coated squeegee
2 is dried at room temperature and cured at 140°C for 2 hours.
3 The preferred hardness of the material forming the outer
4 layer is about 30-35 Shore A and this hardness can be
5 controlled by changing the proportion of MDI in the coating.
6 The coating has a resistivity in the range of 10^8 to 10^{10}
7 ohm-cm, with a preferred value of $1-3 \times 10^8$ to $2-3 \times 10^9$ ohm-cm.

8 In the second embodiment of the squeegee roller, the
9 cast covering for the core is preferably an elastomer having
10 the proper combination of hardness (15-30 Shore A,
11 preferably 20 Shore A) and resistivity ($1-10 \times 10^6$ ohm-cm).
12 This material can be polyurethane, nitrile or other oil
13 resistant rubber. Polyurethane with selectable resistivity
14 and hardness is available from Merthane Products (USA).
15 After casting as described above, the coating is ground to
16 size and finish and coated with a top layer which is made in
17 the same manner as the top layer of the first embodiment.

18 In the third embodiment of the squeegee roller, the top
19 layer is omitted and the conductive elastomer is preferably
20 cast to exact size.

21 Discharge device 28 is operative to flood the sheet 12
22 with light which discharges the voltage remaining on sheet
23 12, mainly to reduce electrical breakdown and improve
24 transfer of the image to intermediate transfer member 30.
25 Operation of such a device in a write black system is
26 described in U.S. Patent 5,280,326, the disclosure of which
27 is incorporated herein by reference.

28 Figs. 1 and 2 further show that multicolor toner spray
29 assembly 20 receives separate supplies of colored toner
30 typically from four different reservoirs 55, 57, 59 and 61.
31 Figure 1 shows four different colored toner reservoirs 55,
32 57, 59 and 61 typically containing the colors Yellow,
33 Magenta, Cyan and, optionally, Black respectively. Pumps 90,
34 92, 94 and 96 may be provided along respective supply
35 conduits 98, 101, 103 and 105 for providing a desired amount
36 of pressure to feed the colored toner to multicolor spray

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1 assembly 20. Alternatively, multicolor toner spray assembly
2 20, which is preferably a three level spray assembly,
3 receives supplies of colored toner from up to six different
4 reservoirs (not shown) which allows for custom colored toner
5 in addition to the standard process colors.

6 A preferred type of toner for use with the present
7 invention is that described in Example 1 of U.S. Patent
8 4,794,651, the disclosure of which is incorporated herein by
9 reference or variants thereof as are well known in the art.
10 For colored liquid developers, carbon black is replaced by
11 color pigments as is well known in the art. Other toners may
12 alternatively be employed, including liquid toners and, as
13 indicated above, including powder toners.

14 Another preferred embodiment of the toner for use in
15 the invention is prepared using the following method:

16 1) Solubilizing 1400 grams of Nucrel 925 (ethylene
17 copolymer by Dupont) and 1400 g of Isopar L (Exxon) are
18 thoroughly mixed in an oil heated Ross Double Planetary
19 Mixer at least 24 RPM for 1.5 hours, with the oil
20 temperature at 130°C. 1200 g of preheated Isopar L is added
21 and mixing is continued for an additional hour. The mixture
22 is cooled to 45°C, while stirring is continued over a period
23 of several hours, to form a viscous material.

24 2) Milling and Grinding 762 grams of the result of the
25 Solubilizing step are ground in a 1S attritor (Union Process
26 Inc. Akron Ohio), charged with 3/16" carbon steel balls at
27 250 RPM, together with 66.7 grams of Mogul L carbon black
28 (Cabot), 6.7 grams of BT 583D (blue pigment produced by
29 Cookson), 5 grams of aluminum tri stearate and an additional
30 1459.6 grams of Isopar L for eight hours at 30°C.

31 3) Continuation of Grinding 34.5 grams of ACumist A-12
32 (a micronised polyethylene wax produced by Allied Signal) is
33 added and grinding is continued for an additional 4 hours.
34 The resulting particles are fibrous particles have a
35 measured diameter in the range of 1-3 micrometers.

36 The resulting material is diluted with additional

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1 Isopar L and Marcol 82 to give a working developer in which
2 the dry solids portion is about 1.7% and in which the
3 overall ratio of Isopar L to Marcol is between about 50:1
4 and 500:1, more preferably between about 100:1 and 200:1.
5 Charge director as described in US patent application
6 07/915,291 (utilizing lecithin, BBP and ICIG3300B) and in WO
7 94/02887, in an amount equal to 40 mg/gm of solids, is added
8 to charge the toner particles. Other charge directors and
9 additional additives as are known in the art may also be
10 used.

11 The above described process produces a black toner.
12 Cyan, magenta and yellow toners can be produced by using a
13 different mix of materials for step 2). For Cyan toner, 822g
14 of the solubilized material, 21.33 grams each of BT 583D and
15 BT 788D pigments (Cookson), 1.73 grams of D1355DD pigment
16 (BASF), 7.59 grams of aluminum tri stearate and 1426 grams
17 of Isopar L are used in step 2. For Magenta toner, 810 grams
18 of solubilized material, 48.3 grams of Finess Red F2B, 6.81
19 grams of aluminum tri-stearate and 1434.2 grams of Isopar L
20 are used in step 2. For yellow toner 810 grams of
21 solubilized material, 49.1 grams of D1355DD pigment, 6.9
22 grams of aluminum tri-stearate and 1423 grams of Isopar L
23 are used in step 2.

24 Intermediate transfer member 30, an especially
25 preferred embodiment of which is described in detail below
26 (in conjunction with Figs. 3 and 4), may, for some
27 embodiments of the invention, be any suitable intermediate
28 transfer member having a multilayered transfer portion such
29 as those described below or in US Patents 5,089,856 or
30 5,047,808 or in the applications of which this application
31 is a continuation in part, the disclosures of which are
32 incorporated herein by reference and by other structures
33 known in the art. Member 30 is maintained at a suitable
34 voltage and temperature for electrostatic transfer of the
35 image thereto from the image bearing surface. Intermediate
36 transfer member 30 is preferably associated with a pressure

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1 roller 71 for transfer of the image onto a final substrate
2 72, such as paper, preferably by heat and pressure. For the
3 especially preferred toner described above, an image
4 temperature of about 95°C at the inception of fusing is
5 preferred.

6 Certain aspects of the present invention, especially
7 the method of mounting a transfer blanket on a drum are of
8 general applicability and are applicable to a wide range of
9 blanket types for ink, liquid toner or powder toner as are
10 known in the art.

11 Cleaning apparatus 32 is operative to scrub clean the
12 surface of photoreceptor 12 and preferably includes a
13 cleaning roller 74, a sprayer 76 to spray a non-polar
14 cleaning liquid to assist in the scrubbing process and a
15 wiper blade 78 to complete the cleaning of the
16 photoconductive surface. Cleaning roller 74 which may be
17 formed of any synthetic resin known in the art for this
18 purpose is driven in the same sense as drum 10 as indicated
19 by arrow 80, such that the surface of the roller scrubs the
20 surface of the photoreceptor. Any residual charge left on
21 the surface of photoreceptor sheet 12 may be removed by
22 flooding the photoconductive surface with light from
23 optional neutralizing lamp assembly 36, which may not be
24 required in practice.

25 In accordance with a preferred embodiment of the
26 invention, after developing each image in a given color, the
27 single color image is transferred to intermediate transfer
28 member 30. Subsequent images in different colors are
29 sequentially transferred in alignment with the previous
30 image onto intermediate transfer member 30. When all of the
31 desired images have been transferred thereto, the complete
32 multi-color image is transferred from transfer member 30 to
33 substrate 72. Impression roller 71 only produces operative
34 engagement between intermediate transfer member 30 and
35 substrate 72 when transfer of the composite image to
36 substrate 72 takes place. Alternatively, each single color

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1 image is separately transferred to the substrate via the
2 intermediate transfer member. In this case, the substrate is
3 fed through the machine once for each color or is held on a
4 platen and contacted with intermediate transfer member 30
5 for composite image transfer. Alternatively, the
6 intermediate transfer member is omitted and the developed
7 single color images are transferred sequentially directly
8 from drum 10 to substrate 72.

9 Figs. 3A, 3B and 4A-4D illustrate a preferred
10 embodiment of intermediate transfer member 30 in accordance
11 with a preferred embodiment of the invention. Fig 3A shows
12 an intermediate transfer blanket 100 mounted on a drum 102.
13 Transfer blanket 100 (whose details are shown in Figs. 4C
14 and 4D) comprises a preferably layered transfer portion 104
15 and a mounting fitting 106.

16 As shown most clearly in Fig. 4C, transfer portion 104
17 comprises a release layer 109 which is outermost on the
18 blanket when it is mounted on drum 102. Underlying layer 109
19 is a conforming layer 111 preferably of a soft elastomer,
20 preferably of polyurethane and preferably having a Shore A
21 hardness of less than about 65, more preferably, less than
22 about 55, but preferably more than about 35. A suitable
23 hardness value is between 45-55, preferably about 50.
24 Underlying layer 111 is a conductive layer 114 which
25 overlays a thin barrier layer 115. Barrier layer 115
26 overlays a blanket body 116 comprising a top layer 118, a
27 compressible layer 120 and a fabric layer 122. Underlying
28 the fabric layer is preferably an adhesive layer 126 which
29 is in contact with drum 102.

30 Drum 102 is preferably heated by an internal halogen
31 lamp heater or other heater to aid transfer of the image to
32 and from the release layer 109 to a final substrate as is
33 well known in the art. Other heating methods, or no heating
34 at all, may also be used in the practice of some aspects of
35 the invention. The degree of heating will depend on the
36 characteristics of the toner and or ink used in conjunction

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1 with the invention.

2 As shown in Figs. 4A, 4B and 4D, mounting fitting 106
3 comprises an elongate electrically conducting bar 108, for
4 example of a metal such as aluminum formed with a series of
5 L-shaped mounting legs 110 (in the form of finger-like
6 extensions) which are also conducting, preferably of the
7 same material as bar 108, and preferably formed integrally
8 therewith. In particular, bar 108 is formed with a slot into
9 which the end of layered transfer portion 104 is inserted.
10 Preferably, the end of the layered portion which is inserted
11 into the mounting bar does not have a release layer 109 or
12 conforming layer 111, whereby conducting layer 114 is
13 exposed and is therefore in electrical contact with bar 108.
14 Alternatively, the bar 108 can be formed with sharp internal
15 projections which pierce the outer layers of the blanket and
16 contact the conducting layer.

17 Optionally, each of the layers beneath the conducting
18 layer 114 may be partially conducting (for example, by the
19 addition of conductive carbon black or metal fibers) and the
20 adhesive layer may be conductive, such that current also
21 flows directly from the drum surface to the conducting
22 layer.

23 In one preferred embodiment of the invention, fitting
24 106 is formed of a single sheet of metal, wherein the legs
25 are partially cut from the metal which is bent into a U
26 shape to form the slot into which the layered portion is
27 inserted. After insertion, the outer walls of the slot are
28 forced against the layered portion to secure the layered
29 portion in the slot. The partially cut out portion is bent
30 to form the mounting legs.

31 In the preferred embodiment of the invention shown in
32 Figs. 1-3, drum 102 is maintained at a potential suitable
33 for transferring images to the intermediate transfer member,
34 for example at 500 volts, which voltage is applied, via
35 mounting fitting 106 to conductive layer 114. Thus, the
36 source of transfer voltage is very near the outer surface of

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1 portion 104 which allows for a lower transfer potential on
2 the drum.

3 In a preferred embodiment of the invention, Transfer
4 portion 104 is fabricated by the following procedure:

5 1- The starting structure for blanket construction is a
6 blanket body 116 generally similar to that generally used
7 for printing blankets. One suitable body is MCC-1129-02
8 manufactured and sold by Reeves SpA, Lodi Vecchio (Milano),
9 Italy. Other preferred blanket types are described in US
10 Patents 5,047,808; 4,984,025; 5,335,054 and PCT publications
11 WO 91/03007; WO 91/14393; WO 90/14619; and WO 90/04216,
12 which are incorporated herein by reference. In a preferred
13 embodiment of the invention, body 116 comprises a fabric
14 layer 122, preferably of woven NOMEX material and having a
15 thickness of about 200 micrometers, a compressible layer
16 120, preferably comprising about 400 micrometers of
17 saturated nitrile rubber loaded with carbon black to
18 increase its thermal conductivity. Layer 120 preferably
19 contains small voids (about 40 - 60 % by volume) and a top
20 layer 118 preferably comprised of the same material as the
21 compressible layer, but without voids. Layer 109 is
22 preferably about 100 micrometers thick. The blanket body is
23 produced by manufacturing methods as are generally used for
24 the production of offset printing blankets for ink offset
25 printing.

26 Blanket body 116 is preferably sized to a relatively
27 exact thickness by abrading portions of the surface of top
28 layer 118. A preferred thickness for the finished body 116
29 is about 700 micrometers, although other thicknesses are
30 useful, depending on the geometry of the printing system in
31 which it is used and the exact materials used in the blanket
32 body.

33 2- The fabric side of blanket body 116 is preferably
34 coated with a 30 micrometer thick coating of silicone based
35 adhesive (preferably, Type D 66 manufactured by Dow
36 Corning). The adhesive is covered with a sheet of mylar

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1 coated with a fluorosilicone material, such as DP 5648
2 Release Paper (one side coat) distributed by H.P. Smith
3 Inc., Bedford Park, IL. This adhesive is characterized by
4 its good bond to the surface of drum 102 and is resistant to
5 the carrier liquid used in the liquid toner. The blanket may
6 be removed from the drum, when its replacement is desired,
7 by cutting the blanket along the edge of fitting 106 and
8 removing the blanket and fitting.

9 An adhesive is used to assure good thermal contact
10 between the back of the blanket and the drum on which it is
11 mounted. A silicone adhesive is used since adhesives
12 normally used in attachment of blankets deteriorate under
13 the heat which is generated in the underlying drum in the
14 preferred apparatus. While the temperature of the drum
15 varies, depending on the thermal resistance of the blanket
16 and the desired surface temperature of the blanket (which in
17 turn depends on the toner used in the process and the
18 details of transfer of the toner to the final substrate),
19 the drum temperature may reach 80°C, 100°C, 120°C or 150°C
20 or more.

21 3- Top layer 118 is preferably coated with a sub-micron
22 layer of primer before being coated with additional layers.
23 A preferred primer is Dow Corning 1205 Prime Coat. The type
24 of primer depends on the properties of the top layer and of
25 the conductive layer. Preferably, 0.3 micron of primer is
26 coated onto a clean top layer with a No. 0 bar in a wire-rod
27 coating apparatus and is allowed to dry before applying the
28 conductive layer.

29 4- Since blanket body 116 may contain materials such as
30 anti-oxidants, anti-ozonants or other additives which may
31 migrate through the upper layers of the blanket, for example
32 as a gas when the blanket is heated during the imaging
33 process and/or in the presence of carrier liquid such as
34 Isopar L, barrier layer 115 is preferably coated onto top
35 layer 118 (or more exactly onto the primer). This barrier
36 layer should be substantially impervious to such materials

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1 in the blanket body which may migrate and/or to the carrier
2 liquid which is used.

3 If this layer is omitted, under certain circumstances
4 the additive materials can cause deterioration of the
5 photoreceptor. In particular, it was found that the imaging
6 process may become humidity dependent.

7 In a preferred embodiment of the invention, a 4-11
8 micrometer layer of polyvinyl alcohol (88% hydrolyzed) is
9 coated onto the primer layer covering top layer 118.

10 Polyvinyl alcohol, 88% hydrolyzed, having an average
11 molecular weight preferably between 85,000 and 145,000
12 (Aldrich Chemical Co. Inc., Milwaukee, WI) is dissolved in
13 water at 90°C by continuously stirring the mixture in a
14 reflux system for 30 minutes. After 30 minutes, a quantity
15 of ethanol equal to twice the quantity of water is added to
16 the solution, the resulting polyvinyl alcohol concentration
17 being preferably less than 10%. Higher concentration
18 solutions can be used; however, they give a more viscous
19 solution which is hard to spread evenly.

20 The solution is deposited on layer 118 of body 116
21 using a fine wire rod or knife inclined at 30-45° to the
22 direction of movement of the knife or body. The solvent is
23 evaporated either by drying at room temperature or by
24 blowing hot air on the layer.

25 One or more coating passes are employed to give the
26 required thickness.

27 Too thin a layer will result in some transfer of
28 material from body 116, which has been correlated with
29 reduced transfer efficiency from the photoreceptor to the
30 intermediate transfer blanket, which is believed to be
31 caused by photoreceptor deterioration. While four
32 micrometers of material appears to be sufficient to avoid
33 leaching, a somewhat larger thickness is preferably used.

34 Other barrier materials and other thicknesses may be
35 used depending on the carrier liquid used for the toner or
36 the gasses omitted by body 116. Other barrier materials may

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1 require lesser or greater thickness depending on their
2 resistance to the carrier liquid or the gasses released by
3 body 116. Alternatively, if body 116 resists leaching by the
4 carrier liquid or does not contain materials which are
5 released (especially when body 116 is heated) or any anti-
6 oxidants and/or anti-ozonants, layer 115 may be omitted.

7 Polyvinyl alcohol is a thermoplastic crystalline
8 material having a melting point which is higher than the
9 temperature of the blanket during operation. Polyvinyl
10 alcohol is also believed to form a layer which is impervious
11 to gasses and to the hydrocarbon carrier liquid used in the
12 liquid toner.

13 5- Conductive layer 114 is preferably formed of acrylic
14 rubber loaded with conductive carbon black. In a preferred
15 embodiment of the invention, only 2-3 micrometers of
16 conductive coating are required. The conductive layer is
17 formed by first compounding 300 grams of Hytemp 4051EP (Zeon
18 Chemicals) with 6 grams of Hytemp NPC 50 and 9 grams of
19 sodium stearate in a two-roll mill for 20 minutes; and then
20 dissolving 150 grams of the compounded material in 2000
21 grams of methyl ethyl ketone (MEK) by stirring for 12 hours
22 at room temperature.

23 40 grams of conductive carbon black, such as, for
24 example, Printex XE2 (Degussa) are added to the solution and
25 the mixture is ground in a 01 attritor (Union Process)
26 loaded with 3/16" steel balls. Grinding proceeds at 10°C for
27 4 hours after which time the material is diluted by the
28 addition of MEK to a concentration of 7.5-8% solids and
29 discharged from the grinder in the form of a conductive
30 lacquer.

31 The blanket (after step 3 or step 4) is overcoated with
32 about 3 micrometers of the conductive lacquer (three passes
33 using a No. 0 rod) and allowed to dry for 5 minutes at room
34 temperature.

35 An additional coating of primer is added over the
36 conductive lacquer (except for the portion which is to be

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1 inserted into bar 108) before the soft elastomeric
2 conforming layer is applied.

3 The resistance of the conductive layer should
4 preferably be more than about 20 kohms/square and preferably
5 less than about 50 kohm/square. This value will depend on
6 the resistivity of the layers above the conducting layer and
7 on the aspect ratio of the blanket. In general, the
8 resistance should be low enough so that the current flowing
9 on the conducting layer (to supply leakage current through
10 the overlying layers) should not cause a substantial
11 variation of voltage along the surface of the blanket. The
12 resistance of the conducting layer and, more importantly,
13 the resistance of the overlying layers control the current
14 flowing through the overlying layers. Generally speaking,
15 the conductive layer has a relatively low resistance and
16 resistivity, the conforming layer (layer 111) has a higher
17 resistivity and the overlying release layer (layer 109) has
18 a still higher resistivity.

19 6- One kg of pre-filtered Fomrez-50 polyester resin
20 (Hagalil Company, Ashdod, Israel) is dehydrated and degassed
21 under vacuum at 60°C. 600 grams of the degassed material is
22 mixed with 1.4 grams of di-butyl-tin-diluarate (Aldrich) and
23 degassed at room temperature for 2 hours. 30 grams of the
24 resulting material, 3.15 grams of RTV Silicone 118 (General
25 Electric) and 4.5 grams of Polyurethane cross-linker,
26 DESMODUR 44V20 (Bayer) are stirred together. A 100
27 micrometer layer of the material is coated over the primed
28 conductive layer using a No. 3 wire rod with several passes
29 under clean conditions, preferably, class 100 conditions.
30 The coating is cured for two hours at room temperature under
31 a clean hood to form a polyurethane layer.

32 Other methods of forming suitable conforming layers are
33 shown and described in the parents of this application.
34 Alternatively, the conductive layer may be omitted and layer
35 118 made conductive.

36 Layer 111 which is thus formed should have a resistance

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1 of the order of about 10^9 ohm-cm, good thermal stability at
2 the working temperature of the blanket surface, which is
3 preferably about 100°C or less.

4 The function of the conforming layer is to provide good
5 conformation of the blanket to the image forming surface
6 (and the image on the image forming surface) at the low
7 pressures used in transfer of the image from the image
8 forming surface to the blanket. The layer should have a
9 Shore A hardness preferably of between 25 or 30 and 65, more
10 preferably about 50. While a thickness of 100 micrometers is
11 preferred, other thicknesses, between 50 micrometers and 300
12 micrometers can be used, with 75 to 125 micrometers being
13 preferred.

14 7- 12 grams of RTV silicone 236 (Dow Corning) release
15 material preferably diluted with 2 grams of Isopar L (Exxon)
16 and 0.72 grams of Syl-off 297 (Dow Corning) are mixed
17 together. A wire rod (bar No. 1) coating system is used,
18 with five or six passes, under clean conditions to achieve
19 an 8 micrometer release layer thickness. The material is
20 cured at 140°C for two hours. The cured release material has
21 a resistivity of approximately 10^{14} to 10^{15} ohm-cm.

22 In order to mount blanket 100 on drum 102, mounting
23 legs 110 are inserted into a plurality of mounting holes 130
24 formed in drum 102, preferably without removing the mylar
25 sheet from the adhesive layer (the back of the blanket). As
26 can be seen most clearly in Fig. 3A, 3B and 4D, mounting
27 legs 110 each have a tip portion 132 and a back portion 134.
28 Tips 132 are inserted into slots formed in the far sidewalls
29 of mounting holes 130 and the back portion 134 rests against
30 the opposite sidewall of the hole. In this way the end of
31 the blanket is accurately positioned. The edge of the mylar
32 sheet closest to the legs is removed and the remainder of
33 the mylar sheet is progressively removed while making sure
34 that the successive portions of the blanket which are thus
35 attached to the drum by the adhesive lie flat against the
36 drum.

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1 The present inventors have found that this method of
2 mounting is far superior to either adhesive mounting alone
3 or to grippers at both ends of the blanket in providing a
4 stable transfer surface.

5 As an alternative to, or additional to, the adhesive
6 layer 126, a very soft conforming layer may be used at the
7 back of the blanket. A soft layer of this type will allow
8 for good thermal contact between the blanket and the heated
9 drum 102 so that the temperature of the drum need not be
10 excessive in order for the outer surface of the blanket to
11 reach its operating temperature. Furthermore, such a very
12 soft layer will cause the blanket to "cling" to the drum
13 obviating the use of adhesive under certain circumstances.
14 Furthermore, when the blanket is replaced there is no
15 adhesive residue on the drum to be removed.

16 A very soft layer may be produced by the following
17 method:

18 1- 100g of Hi-Temp 4051 EP (Zeon) acrylic resin is
19 mixed with 2g NPC-50 crosslinker (Zeon) and 3g sodium
20 stearate and dissolved in toluene to give a solution of 15%
21 non-volatile solids. Optionally, up to about 40g of carbon
22 black Pearls 130 (Cabot) is added.

23 2- A thin layer of the solution is coated onto release
24 coated mylar and dried. This process is repeated several
25 times until a thickness of preferably 20-30 micrometers is
26 achieved.

27 3- The uncured resin is laminated to the adhesive
28 layer of a blanket produced in accordance with the
29 invention, or directly to the fabric layer. This step is
30 preferably carried out prior to the cure of the release
31 layer.

32 4- The laminated structure is cured together with the
33 release layer and the release coated mylar is removed.

34 The layer has a Shore A hardness of about 20-24
35 without carbon black and about 40-45 with carbon black.
36 Softer materials are also suitable; however, substantially

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1 harder materials do not adhere well to the drum surface.
2 Optionally, the adhesive layer at the trailing end of the
3 blanket is not coated with the very soft layer to improve
4 coherence of the blanket and the drum. This is especially
5 desirable for harder layers.

6 The acrylic material may be replaced by other soft
7 elastomer materials such as soft polyurethane or nitrile
8 rubber. Other heat improving fillers which have a smaller
9 effect on the hardness of the final product may be used
10 instead of carbon black, such as Fe_2O_3 or alpha aluminum
11 oxide.

12 Fig. 5 shows an alternative, preferred embodiment of
13 the invention in which somewhat different shaped holes 130'
14 are used. In this embodiment the back portion 134 rests
15 against a protrusion 150 formed on one side of the hole
16 while a surface 154 of leg 110 rests against the bottom 156
17 of a protrusion formed on the other side of the hole.

18 While the preferred electrical connection between the
19 conductive layer and the mounting bar is preferably achieved
20 by removing (or not forming) the layers which overlay an end
21 portion of the conductive layer, piercing the overlying
22 layers, for example, by crimping and/or piercing the
23 mounting bar, for example, at points marked 160 in Fig. 4D.
24 Crimping can also be used to hold the blanket in the
25 mounting bar.

26 While the adhesive layer preferably covers the back of
27 the blanket, alternatively the adhesive layer may cover only
28 a portion of the back such as the edge farthest away from
29 the bracket (the trailing edge of the blanket); or may, for
30 some embodiments of the invention and under certain
31 circumstances, be omitted.

32 It should be understood that some aspects of the
33 invention are not limited to the specific type of image
34 forming system used and some aspects of the present
35 invention are also useful with any suitable imaging system
36 which forms a liquid toner image on an image forming surface

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1 and, for some aspects of the invention, with powder toner
2 systems. Some aspects of the invention are also useful in
3 systems such as those using other types of intermediate
4 transfer members such as belt or continuous coated drum type
5 transfer members. Some aspects of the invention are suitable
6 for use with offset printing systems. The specific details
7 given above for the image forming system are included as
8 part of a best mode of carrying out the invention; however,
9 many aspects of the invention are applicable to a wide range
10 of systems as known in the art for electrophotographic and
11 offset printing and copying.

12 It will be appreciated by persons skilled in the art
13 that the present invention is not limited by the description
14 and example provided hereinabove. Rather, the scope of this
15 invention is defined only by the claims which follow:

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1 CLAIMS

2 1. Imaging apparatus comprising:

3 an imaging surface having a toner image formed thereon;
4 and

5 an intermediate transfer member, which receives the
6 toner image from the imaging surface and from which it is
7 subsequently transferred, comprising:

8 a drum having mounting recesses formed therein; and

9 an intermediate transfer blanket mounted on the
10 drum, the blanket comprising:

11 a layered transfer portion having a transfer
12 surface on one face thereof which receives the toner image;
13 and

14 a mounting fixture, attached to only one edge of
15 the layered transfer portion and adapted to mate with the
16 mounting recesses in the drum,

17 whereby the transfer blanket is removably mounted on
18 the drum.

19

20 2. Apparatus according to claim 1 wherein at least a
21 portion of a surface of the layered transfer portion
22 opposite to the transfer surface is bonded to the drum.

23

24 3. Apparatus according to claim 1 or claim 2 wherein the
25 layered transfer portion comprises an adhesive layer on a
26 second face thereof opposite the transfer surface.

27

28 4. Apparatus according to any of the preceding claims
29 wherein the layered transfer portion comprises an
30 electrically conductive layer underlying the transfer
31 surface; and

32 wherein the mounting fixture comprises an electrically
33 conductive element, attached to one edge of the transfer
34 portion, which is electrically connected to the electrically
35 conductive layer.

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1 5. Apparatus according to claim 4 wherein the electrically
2 conductive element contacts the drum and wherein the drum is
3 electrified to a voltage which is operative to transfer the
4 toner image from the imaging surface to the transfer
5 surface.

6

7 6. Apparatus according to claim 4 wherein the electrically
8 conductive element comprises at least one "L" shaped finger-
9 like extension extending therefrom.

10

11 7. Apparatus according to claim 6 wherein said at least
12 one "L" shaped extension has a first portion extending in a
13 direction perpendicular to the layered transfer portion and
14 a second portion attached and substantially perpendicular
15 to the first portion and extending substantially parallel to
16 and away from the layered transfer portion.

17

18 8. Apparatus according to claim 7 wherein said mounting
19 recesses further comprise recesses therein which receive
20 said second portion.

21

22 9. A substantially rectangular intermediate transfer
23 blanket comprising:

24 a layered transfer portion having a transfer surface on
25 one face thereof; and

26 a mounting fixture, adapted for mounting the blanket on
27 a drum, attached to only one edge of the layered transfer
28 portion.

29

30 10. An intermediate transfer blanket according to claim 9
31 wherein the layered transfer portion comprises an
32 electrically conductive layer underlying the transfer
33 surface; and

34 wherein the mounting fixture comprises an electrically
35 conductive element, attached to one edge of the transfer
36 portion, which is electrically connected to the electrically

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1 conductive layer.

2

3 11. A substantially rectangular intermediate transfer
4 blanket comprising:

5 a layered transfer portion having a transfer surface on
6 one face and including an electrically conductive layer
7 underlying the transfer surface; and

8 an electrically conductive element, attached to one
9 edge of the transfer portion, which is electrically
10 connected to the conducting layer.

11

12 12. An intermediate transfer blanket according to claim 10
13 or claim 11 wherein the conductive element comprises at
14 least one "L" shaped finger-like extension extending
15 therefrom.

16

17 13. An intermediate transfer blanket according to claim 12
18 wherein said at least one "L" shaped extension has a first
19 portion extending in a direction perpendicular to the
20 layered transfer portion and a second portion attached and
21 substantially perpendicular to the first portion extending
22 away from the layered transfer portion.

23

24 14. An intermediate transfer blanket according to any of
25 claims 9-13 wherein the layered transfer portion comprises a
26 conformal layer formed of a material having a Shore A
27 hardness of less than 65.

28

29 15. A layered intermediate transfer member comprising:

30 an outermost transfer surface; and

31 a conforming layer operatively associated with the
32 transfer surface and having a shore A hardness of less than
33 about 65.

34

35 16. A substantially rectangular intermediate transfer
36 member according to claim 15.

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1

2 17. An intermediate transfer member according to any of
3 claims 14-16 wherein said conforming layer has a Shore A
4 hardness of less than about 50.

5

6 18. An intermediate transfer member according to any of
7 claims 14-17 wherein said conforming layer has a Shore A
8 hardness of more than about 30.

9

10 19. An intermediate transfer member according to claim 18
11 wherein said conforming layer has a Shore A hardness of more
12 than about 35.

13

14 20. An intermediate transfer blanket according to any of
15 claims 9-19 wherein the layered transfer portion comprises a
16 soft layer, having a Shore A hardness of less than 90, on
17 the surface of the layered transfer portion opposite to the
18 transfer surface.

19

20 21. A layered intermediate transfer blanket comprising:
21 an transfer surface on one face of the blanket; and
22 a soft layer on the opposite face of the blanket which
23 has a Shore A hardness of less than 90.

24

25 22. An intermediate transfer member according to claim 20
26 or claim 21 wherein the soft layer has a Shore A hardness of
27 less than about 45.

28

29 23. An intermediate transfer member according to claim 20
30 or claim 23 wherein the soft layer has a Shore A hardness of
31 less than about 25.

32

33 24. An intermediate transfer member according to claim 20
34 or claim 23 wherein the soft layer has a Shore A hardness of
35 about 45.

36

PCNS

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1 25. An intermediate transfer blanket according to any of
2 claims 20-24 wherein the soft layer comprises an acrylic
3 elastomer.

4

5 26. An intermediate transfer member according to any of
6 claims 9-19 and including:

7 an adhesive layer on the opposite face of the blanket
8 from the transfer surface.

9

10 27. An intermediate transfer member according to claim 26
11 wherein the adhesive layer is stable at a temperature of at
12 least 80°C.

13

14 28. A layered intermediate transfer blanket comprising:

15 an transfer surface on one face of the blanket; and

16 an adhesive layer on the opposite face of the blanket
17 which is stable at a temperature of at least 80°C.

18

19 29. An intermediate transfer blanket according to any of
20 claims 26-28 wherein the adhesive layer is stable at a
21 temperature above 100°C.

22

23 30. An intermediate transfer blanket according to claim 29
24 wherein the adhesive layer is stable at a temperature above
25 120°C.

26

27 31. An intermediate transfer blanket according to claim 29
28 wherein the adhesive layer is stable at a temperature above
29 150°C.

30

31 32. An intermediate transfer member according to any of
32 claims 9-31 and including:

33 a resilient layer underlying the transfer surface; and

34 a barrier layer that is substantially impervious to
35 liquid hydrocarbons and is situated intermediate the
36 resilient layer and the transfer surface.

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- 1
2 33. A layered intermediate transfer member, comprising:
3 a transfer surface;
4 a resilient layer underlying the transfer surface; and
5 a barrier layer that is substantially impervious to
6 liquid hydrocarbons and is situated intermediate the
7 resilient layer and the transfer surface.
8
- 9 34. An intermediate transfer member according to claim 32
10 or claim 33 wherein the resilient layer comprises a material
11 which is at least partly leachable by the liquid
12 hydrocarbon.
13
- 14 35. An intermediate transfer member according to any of
15 claims 32-34 wherein the member is adapted for the transfer
16 of liquid toner images comprising toner particles and
17 carrier liquid and wherein the liquid hydrocarbon is said
18 carrier liquid.
19
- 20 36. An intermediate transfer member according to any of
21 claims 9-31 and including:
22 a resilient layer underlying the transfer surface; and
23 a barrier layer that is substantially impervious to
24 gases and is situated intermediate the resilient layer and
25 the transfer surface.
26
- 27 37. A layered intermediate transfer member, comprising:
28 a transfer surface;
29 a resilient layer underlying the transfer surface which
30 releases gases; and
31 a barrier layer that is substantially impervious to the
32 gasses and is situated intermediate the resilient layer and
33 the transfer surface.
34
- 35 38. An transfer member according to any of claims 31-37
36 wherein the barrier layer comprises at least partially

PCNS

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1 hydrolyzed polyvinyl alcohol.

2

3 39. An intermediate transfer member comprising:

4 a conductive layer having a relatively low electrical
5 resistivity;

6 an outer layer having a relatively high electrical
7 resistivity; and

8 a third layer intermediate the conductive and outer
9 layers having an electrical resistivity intermediate the
10 relatively low and relatively high electrical resistivities.

11

12 40. An intermediate transfer member according to claim 39
13 wherein the third layer is a conforming layer having a Shore
14 A hardness of less than about 65.

15

16 41. An intermediate transfer member according to any of
17 claims 9-40 wherein the outer layer is a release layer for
18 toner.

19

20 42. Imaging apparatus for performing an imaging process,
21 comprising:

22 an imaging surface having a liquid toner image
23 comprising toner particles and carrier liquid formed
24 thereon; and

25 an intermediate transfer member according to any of
26 claims 9-31, which receives the toner image from the imaging
27 surface and from which it is subsequently transferred.

28

29 43. Imaging apparatus for performing an imaging process,
30 comprising:

31 an imaging surface having a liquid toner image
32 comprising toner particles and carrier liquid formed
33 thereon; and

34 an intermediate transfer member, which receives the
35 toner image from the imaging surface and from which it is
36 subsequently transferred, comprising:

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1 a layered transfer portion having a transfer
2 surface on one face thereof which receives the toner image;
3 a resilient layer underlying the transfer surface
4 which comprises a material which interferes with the
5 operation of the imaging process;
6 a barrier layer that is substantially impervious
7 to the interfering material comprised in the resilient layer
8 and is situated intermediate the resilient layer and the
9 transfer surface.

10

11 44. Imaging apparatus according to claim 43 wherein the
12 barrier layer comprises at least partially hydrolyzed
13 polyvinyl alcohol.

14

15 45. Imaging apparatus according to claim 43 or claim 44
16 wherein the barrier layer is a barrier layer for gasses.

17

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36. —

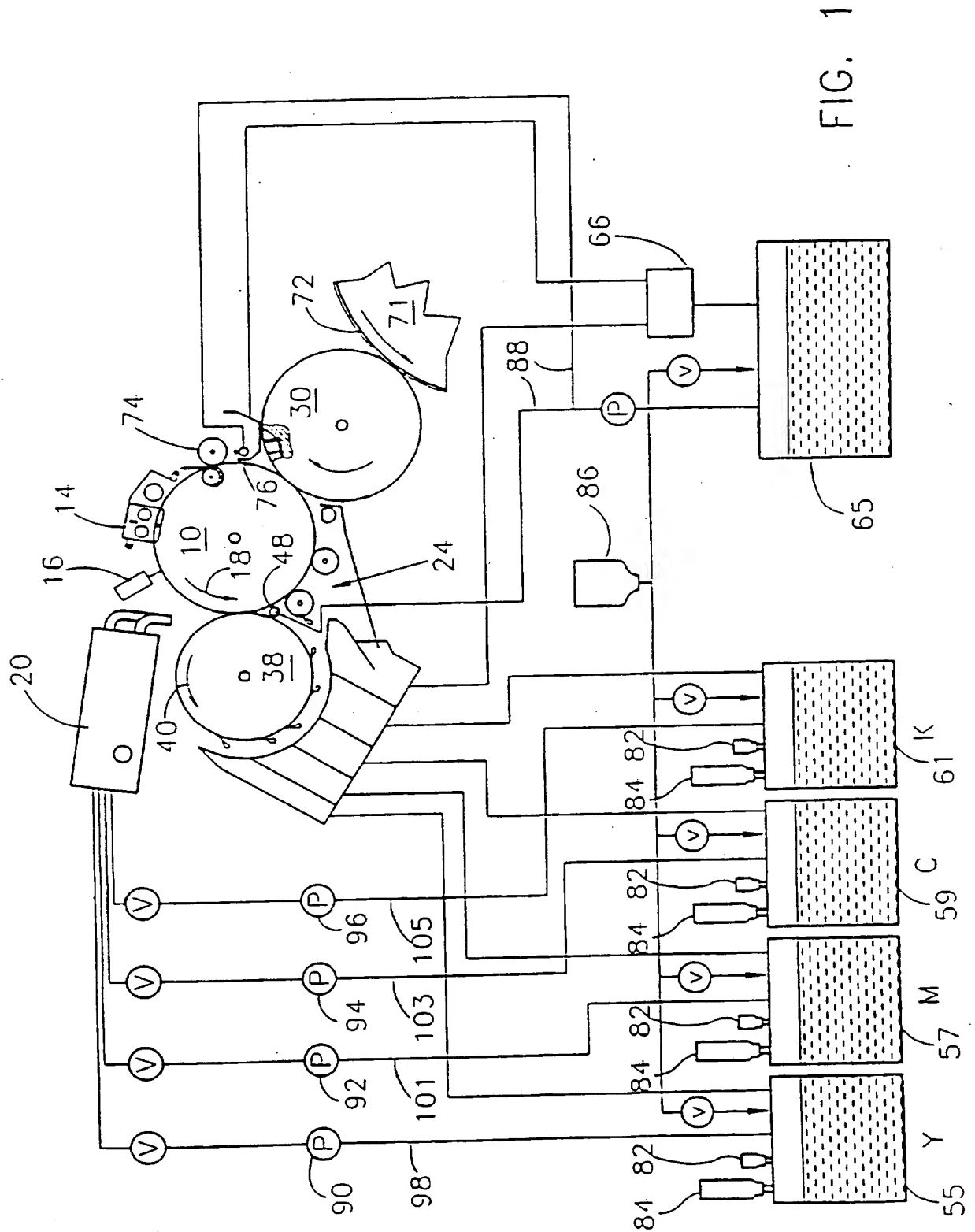
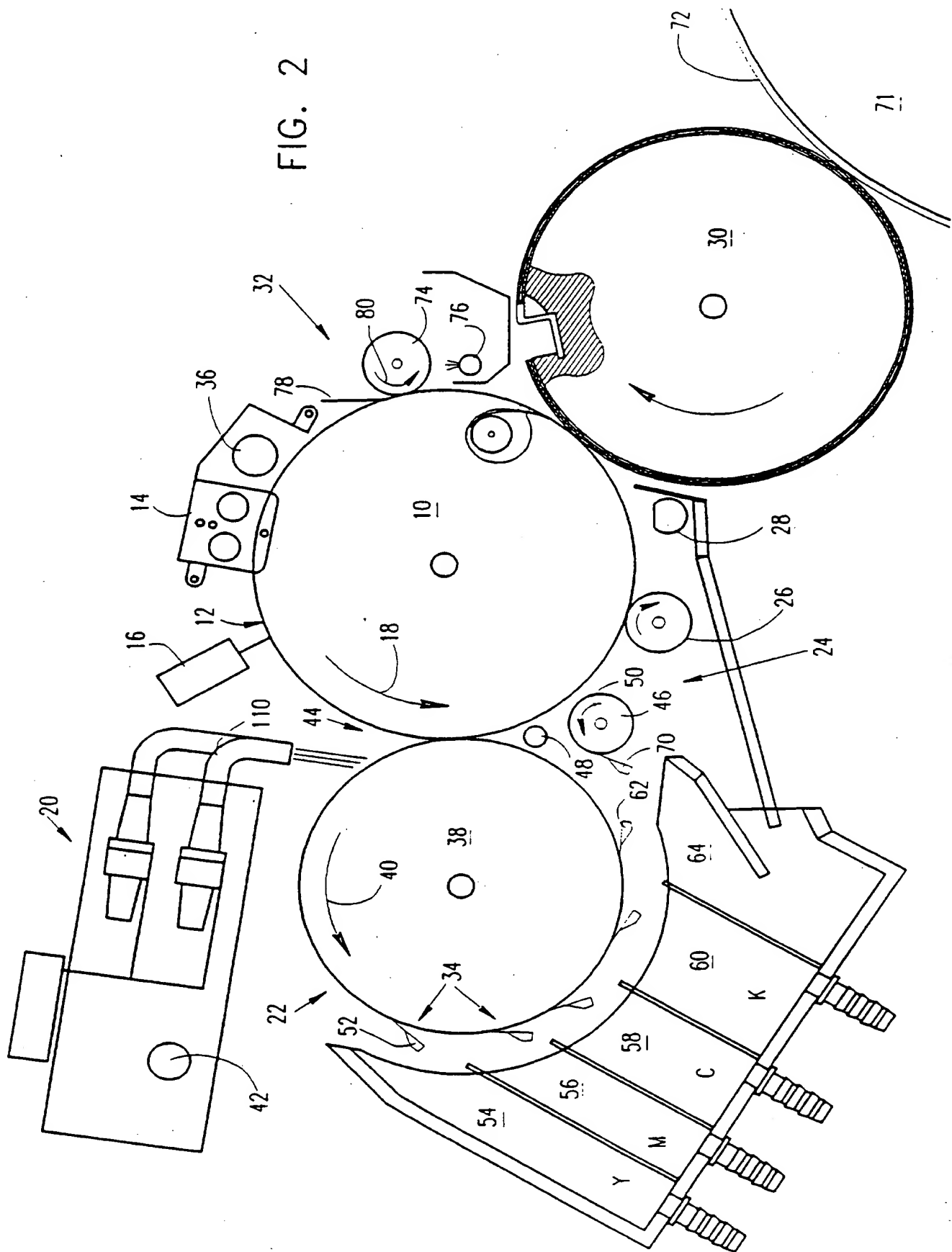


FIG. 2



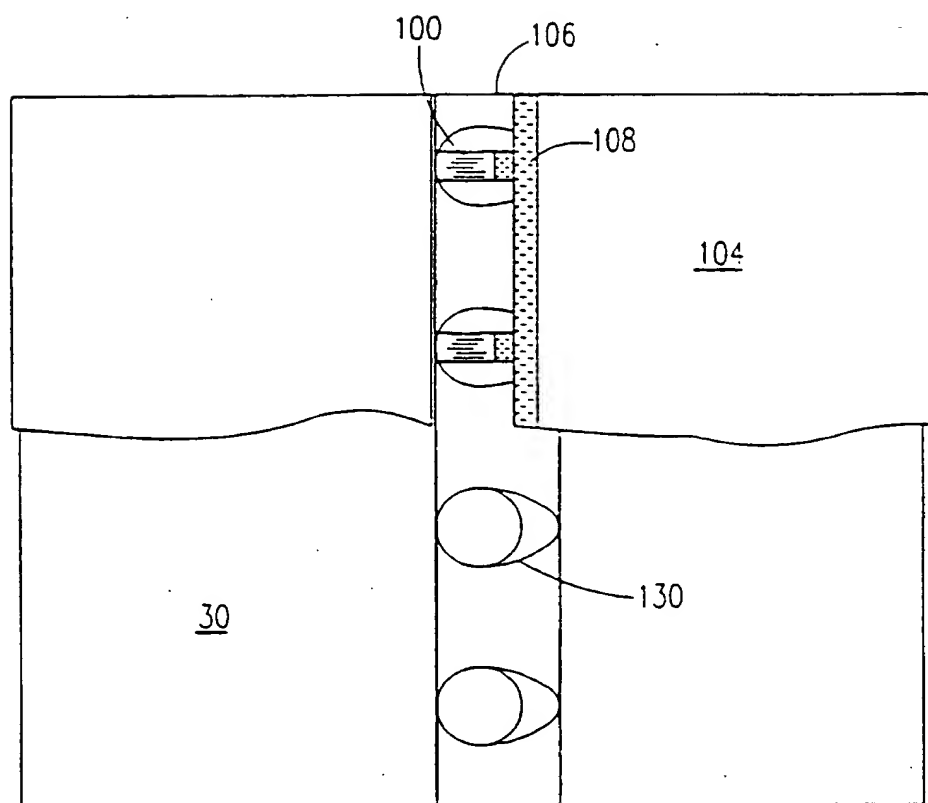


FIG. 3B

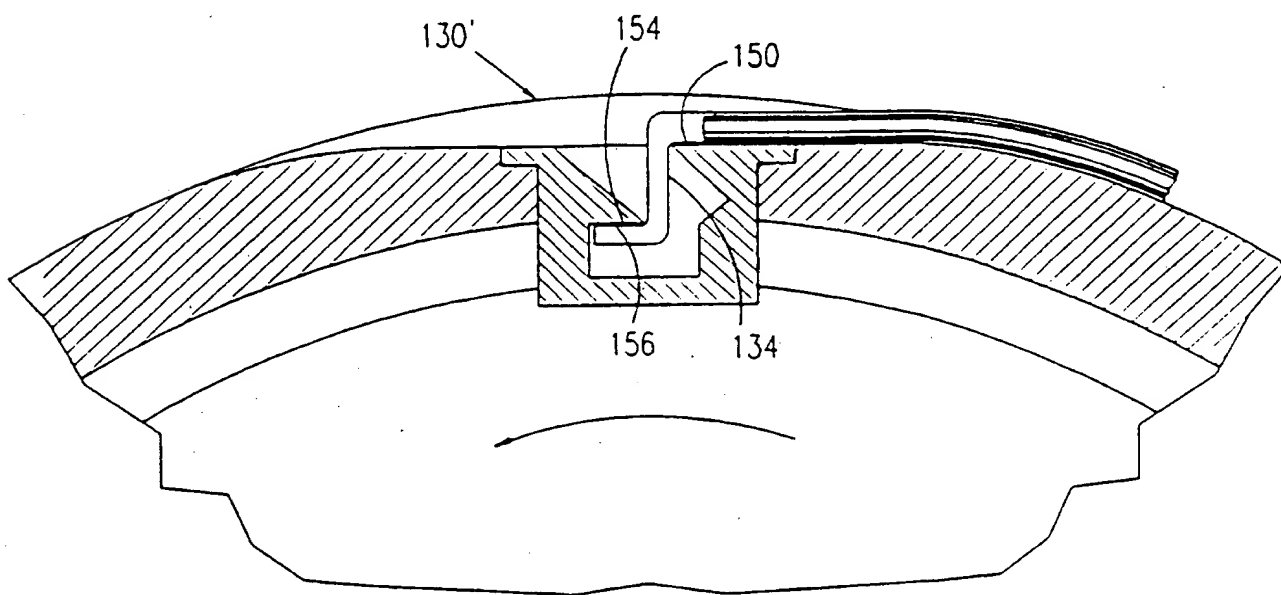


FIG. 5

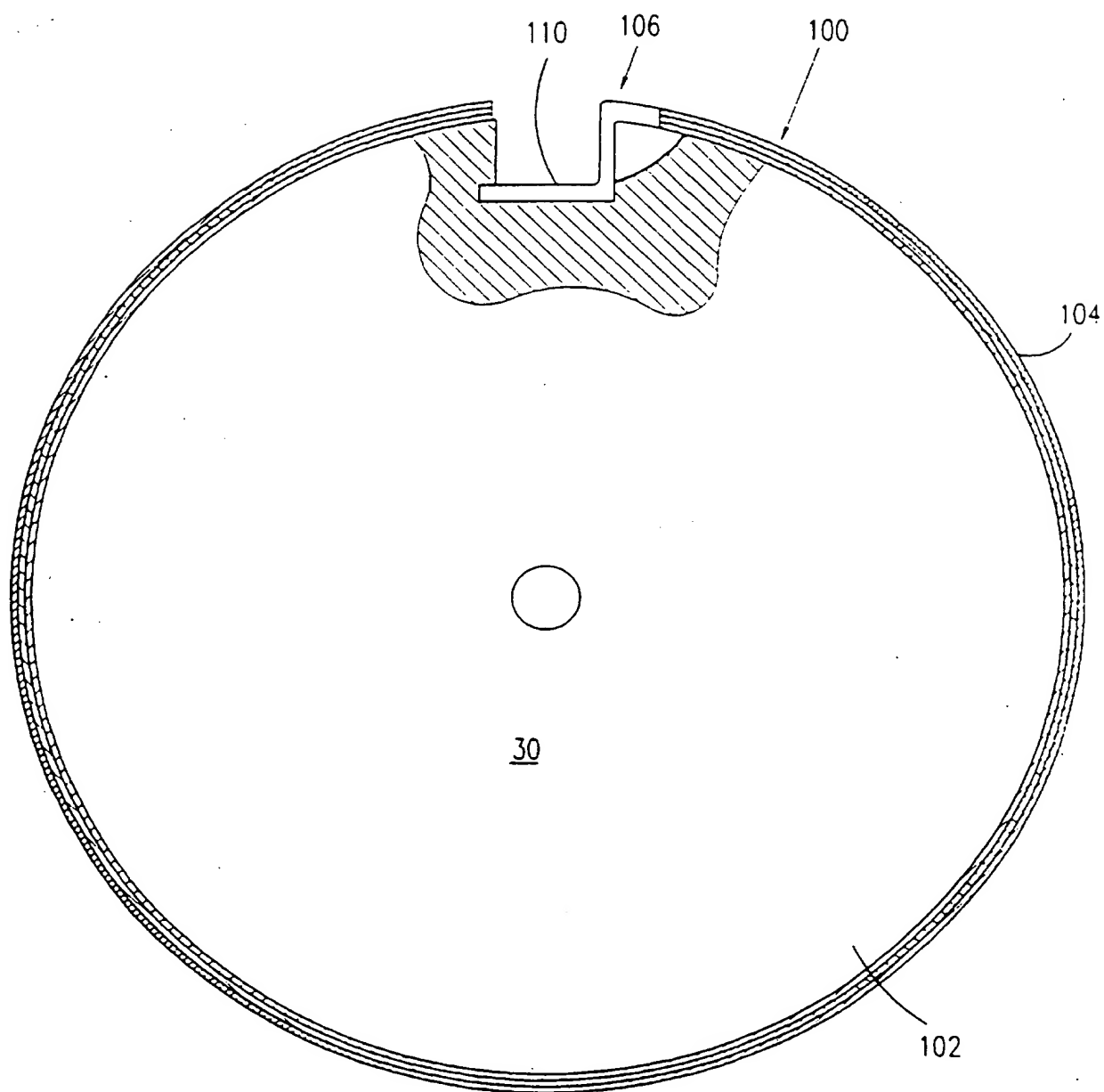


FIG. 3A

FIG. 4A

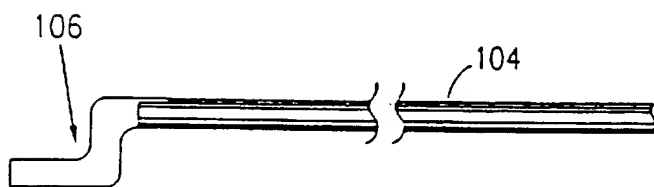
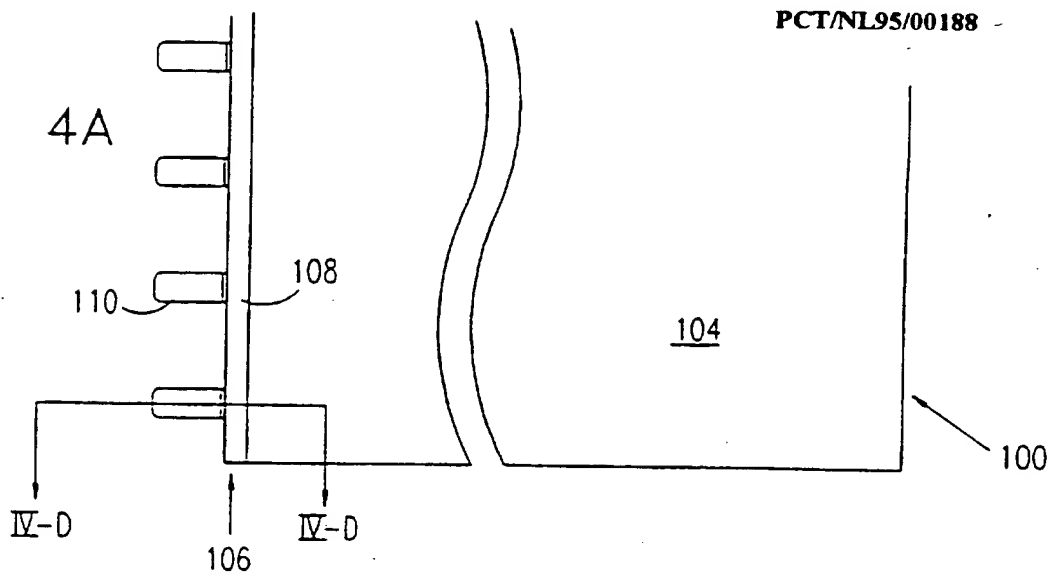


FIG. 4B

FIG. 4C

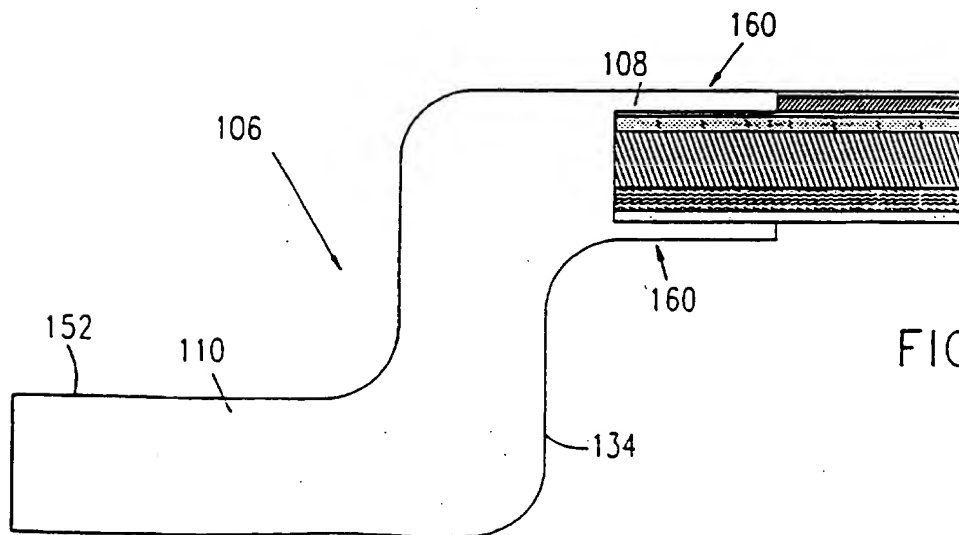
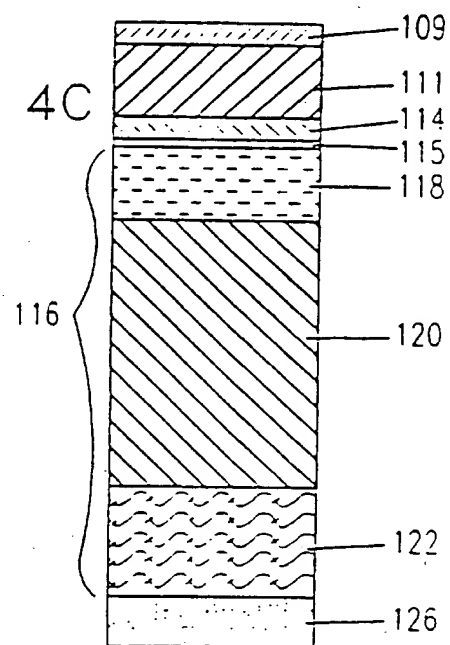


FIG. 4D

INTERNATIONAL SEARCH REPORT

Intern. Application No.
PCT/NL 95/00188

A. CLASSIFICATION OF SUBJECT MATTER G 03 G 15/16		
According to International Patent Classification (IPC) or to both national classification and IPC 6		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) G 03 G, B 41 F, G 03 F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5 089 856 (LANDA) 18 February 1992 (18.02.92), fig. 1, 3A, 3B, 3C; column 6, lines 19-57 figs; abstract; claims (cited in the application).	1, 2, 9, 10
A		4-6, 11, 26, 28, 33, 35, 36, 42, 43
Y	-- US, A, 4 873 926 (SIMETH) 17 October 1989 (17.10.89), fig. 1-3; abstract; column 2, line 48 - column 3, line 6. the whole document.	1, 2, 9, 10
A		3-7, 11-13
<div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex. </div>		
* Special categories of cited documents : <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>		
Date of the actual completion of the international search 31 August 1995		Date of mailing of the international search report - 6. 10. 95
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016		Authorized officer KRAL e.h.

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/NL 95/00188

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p style="text-align: center;">--</p> <p>WO, A, 90/14 619 (SPECTRUM) 29 November 1990 (29.11.90), fig. 1,12; page 15, lines 13-16; page 23, lines 26-38 (cited in the application).</p>	<p>1,2, 4-13, 33,35, 42,43</p>
A	<p style="text-align: center;">--</p> <p>GB, A, 2 232 930 (HEIDELBERGER DRUCKMASCHINEN) 02 January 1991 (02.01.91), figs; abstract; page 8, lines 13-29; claims.</p>	<p>1,2, 4-9</p>
A	<p style="text-align: center;">--</p> <p>EP, A, 0 593 781 (TOKYO INK) 27 April 1994 (27.04.94), figs; column 4, lines 12-68.</p>	<p>1-13, 26,28, 33,35</p>
A	<p style="text-align: center;">--</p> <p>US, A, 4 984 025 (LANDA) 08 January 1991 (08.01.91), fig. 6,7; column 10, lines 45-63 (cited in the application).</p> <p style="text-align: center;">----</p>	<p>1,4-6, 9-11, 33,35, 36,42, 43</p>

ANEXE

au rapport de recherche inter-
national relatif à la demande de brevet
international n°

La présente annexe indique les
mémoires de la famille de brevets
relatifs aux documents de brevets cités
dans le rapport de recherche inter-
national visée ci-dessus. Les renseigne-
ments fournis sont donnés à titre indica-
tif et n'engagent pas la responsabilité
de l'Office.

In Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche		Datum der Veröffentlichung Publication date Date de publication		Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets		Datum der Veröffentlichung Publication date Date de publication	
US A	5089856	18-02-92	6901897	18-02-92	6901897	18-02-92	6901897
US A	4873926	17-10-89	1411141	17-10-89	1411141	17-10-89	1411141
WO A1	9014619	27-11-90	1411141	27-11-90	1411141	27-11-90	1411141
GB A1	2232930	02-01-91	1411141	02-01-91	1411141	02-01-91	1411141
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